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REMARKS

Claims 1 to 6 and 14 to 21 remain pending in the above-identified application.

§103 Rejections of Claims 1, 3 to 6, and 14

The Examiner rejected claims 1, 3 to 6, and 14 under 35 U.S.C. 103(a) as being unpatentable over by U.S. Patent No. 6,424,375 ("Fowler") in view of U.S. Patent No. 6,002,123 ("Suzuki").

Claim 1

Addressing claim 1, the Examiner found that Fowler discloses a reference voltage source V_{pr} that generates a reset voltage V_g coupled by a switching device 122 to one of a plurality of reset lines for a plurality of rows of pixels as further evidenced by the Tartagni article incorporated by reference. July 27, 2006 Final Office Action, pp. 3 and 4. The Examiner found that Fowler does not disclose that reference voltage source V_{pr} generates a ground referenced reset voltage that is independent of the supply voltage. July 27, 2006 Final Office Action, p. 4. The Examiner then took official notice that it is well known in the art for a reference voltage source to generate a ground referenced reset voltage and therefore it would be obvious for one of ordinary skill in the art at the time of the invention to modify the sensor of Fowler with a reference voltage source that generates a ground referenced reset voltage. July 27, 2006 Final Office Action, p. 4. The Examiner cited Suzuki to support this contention because the Examiner believed that Suzuki discloses a reference voltage source that generates a reset voltage that is independent of the supply voltage.

However, the Applicant asserts that Suzuki is silent as to the reference voltage source, whether supply dependent or independent. In figure 1, Suzuki illustrates reset lines (16) being driven by a scanner (20). Respectfully, one skilled in the art can see that the VDD line (supply voltage) is not connected to the controls of the scanner (20). Based on that, the reset lines are independent of the supply voltage (Suzuki, col. 3, line 45 – col. 4, line 23).

July 27, 2006 Office Action, p. 3. Applicant respectfully traverses.

Applicant first notes that the Examiner has mischaracterized Fowler in the following ways. "V_{pr}" is not a reference voltage source. Instead, V_{pr} is a gate voltage used to turn on transistor 120 to pull voltage V_{pd} at readout node 110 to ground. See Fowler, col. 4, lines 51 and 52, Figs. 1 and 2. "V_g" is not a reset voltage generated by a reference voltage source. Instead, V_g is a gate voltage that turns on transistor 122 to couple an output of a compare module 106 (e.g., an op-amp) to a gate of a transistor 108, which then couples supply voltage V_{dd} to pixel device 112.

See Fowler, Figs. 1 and 2. Applicant notes that Fowler itself misuses gate voltage V_g as the output from compare module 106 at several places in contradiction to Figs. 1 and 2. Applicant notes that in Fowler, the actual reference voltage that resets pixel device 112 is voltage V_r applied to a positive terminal of compare module 106 or voltage V_2 derived from voltage V_r .

The compare module 106 has at least two inputs and an output. A first input 105 is coupled to a reset voltage, v_r , for resetting a pixel device 112. The reset voltage, v_r , can be derived from a source internal or external to the APS 100. A second input 107 to the compare module 106 is coupled to the readout node 110 and to switch 120 to provide a closed-loop feedback path for the reset circuit 102.

Fowler, col. 4, lines 7 to 15 (emphasis added).

The Examiner did not provide a proper motivation or suggestion for one skilled in the art to modify Fowler with a reference voltage source that generates a ground referenced reset voltage. While it is known that a reference voltage source can generate a ground referenced voltage, there must be a reason to use a reference voltage source that generates a ground referenced voltage. The Examiner stated that modifying Fowler with a ground referenced reset voltage "provides high-accuracy feedback for removing noise in image signals." July 27, 2006 Final Office Action, p. 4. Fowler discloses the use of a feedback loop (a "reset control loop") from readout node 110 to inverted input 107 of compare module 106 to eliminate the reset noise contributed by transistor 108. However, Fowler does not provide any motivation or suggestion for one skilled in the art to use a ground referenced reset voltage V_r at input 105 of compare module 106. Fowler simply does not disclose any reset noise that originates from reset voltage V_r . Instead, Fowler focuses on the reset noise that originates from transistor 108. Accordingly, one skilled in the art would not have any reason to use a ground referenced reset voltage V_r .

Furthermore, Suzuki does not disclose a "reference voltage source [that] generates a ground referenced reset voltage that is independent of the supply voltage" as recited in amended claim 1. Suzuki discloses that reset line 16 receives reset voltage VR_n from scanner 20. However, Suzuki is simply silent as to how scanner 20 generates reset voltage VR_n and whether or not reset voltage VR_n is ground referenced. The Examiner cannot assume that Suzuki discloses a ground referenced reset voltage VR_n because Suzuki does not show scanner 20 coupled to V_{dd} . By the very same logic, Suzuki also cannot disclose a ground referenced reset voltage VR_n because Suzuki does not show scanner 20 coupled to ground. Thus, Suzuki does not disclose that scanner 20 generates a ground referenced reset voltage VR_n .

Fowler does not disclose a switching device that selectively couples a ground referenced reset voltage to one of a plurality of reset lines for a plurality of rows of pixels. While Fowler may be applicable to other types of sensors, including those shown in the Tartagni article, it does not disclose how it would be modified to work with other types of sensors. More specifically, it is unclear how the reset control loop of active pixel sensor 100 would be modified and affected by the addition of a switching device that selectively couples reset voltage V_r or voltage V_2 . As discussed in the previous responses to office actions, compare module 106 has its inverted input coupled to a single readout node 110 of a single pixel device 112 to provide a feedback loop for that particular pixel. It is unclear how the feedback path would be modified to accommodate one reset line for multiple pixels without deviating from the operating principles of the original invention disclosed in Fowler. For example, does the Examiner propose to couple the reset control loop to all the readout nodes of all the pixel devices in a row, or does the Examiner propose to couple the reset control loop to only one of the readout nodes of the pixel devices in a row? Until the Examiner explains in detail how the reset control loop would be modified, Applicant cannot properly address this rejection by arguing how the modification changes the operation of Fowler and/or make it unsuitable for its intended purpose.

For the above reason, claim 1 is patentable over Fowler and Suzuki.

Claims 3 to 6 and 14

Claims 3 to 6 and 14 depend from amended claim 1 and are patentable over the combination of Fowler and Suzuki for at least the same reasons as amended claim 1.

§ 103 Rejections of Claims 15 to 20

The Examiner rejected claims 15 to 20 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,133,862 ("Dhuse et al.") in view of Suzuki.

Amended claim 15 recites "a ground referenced reset voltage that is independent of a supply voltage," which is not disclosed by Suzuki as discussed above in regards to amended claim 1. Amended claim 15. Accordingly, amended claim 15 is patentable over the combination of Dhuse et al. and Merrill et al. for at least the same reasons as amended claim 1.

Claims 16 to 20 depend from amended claim 15 and are patentable over the combination of Dhuse et al. and Merrill et al. for at least the same reasons as amended claim 15.

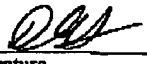
Allowable Subject Matter

Applicant thanks the Examiner for allowing claim 2 and indicating that claim 21 is allowable if rewritten in independent form including all the limitations of its base claim and any intervening claims.

Applicant has not amended claim 21 to independent form because Applicant believes it base claim 1 is patentable over the cited references.

Summary

In summary, claims 1 to 6 and 14 to 21 were pending in the present application. For the above reasons, Applicant respectfully requests the Examiner to withdraw her claim rejections and allow claims 1 to 6 and 14 to 21. Should the Examiner have any questions, please call the undersigned at (408) 382-0480x206.

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Respectfully submitted,



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